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GAS ABSTRACTS

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1. GAS INDUSTRY

Bureau of Mines Oil Shale Plant

BUREAU OF MINES UNVEILS $2 MILLION OIL SHALE PLANT MAY 17 IN COLORADO. *Natl. Petroleum News* 39, 50 (1947) *May* 14.

The Bureau of Mines oil shale demonstration plant was dedicated May 17. The plant includes two N-T-U batch-type retorts for "cooking" oil from shale. At the outset the plant will have a capacity of 80 tons of shale per day, yielding 55 bbls. of raw oil per day. Future plans include the installation of refining equipment.

R. S. Goodrick

Carbon Black Industry

Weber, G. CARBON BLACK FACES PROGRESSIVE CHANGES. *Oil Gas J.* 45, 94-98 (1947) *May* 3.

The carbon black industry is reviewed. Since 1940 there has been a notable increase in production by the furnace process. The advantages of this process are: (1) higher yield, (2) wider range of products, and (3) possibilities for further improvement and diversification of products. The location and daily capacity of the furnace process plants are given.

R. S. Goodrick

Natural Gasoline Industry

Lott, F. S. and Seeley, E. M. NATURAL GASOLINE AND CYCLE PLANTS IN THE UNITED STATES, JANUARY 1, 1946. *U. S. Bureau Mines I. C.* 7399 (1947) *April.*

The location, daily capacity, and type of natural gasoline and cycling plants of the U. S. as of January 1, 1946 are presented.

R. S. Goodrick

Proration

Baumel, J. K. PRORATION AND RATABLE TAKE. FEASIBILITY AND POSSIBILITY OF A STATEWIDE PLAN. *Gas* 23, 39-42 (1947) *April.*

"Statewide gas proration is an ideal system to strive for, and as our gas reserves increase it is the only method that can be used to prevent selective buying. Under such a system, each field can be allocated an allowable, based on the efficient withdrawal, that will prevent premature encroachment and coning of water." The elements of a plan for statewide proration in the interest of accelerating conservation are discussed.

Author's abstract

The following articles, which have not been abstracted, are called to your attention:

LEGISLATION TO REDEFINE NATURAL GAS ACT. *Gas Age* 99, 31, 48 (1947) *May* 1.

TEXAS EASTERN TAKES OVER BIG INCH PIPE-LINE SYSTEM. *Oil Gas J.* 45, 38 (1947) *May* 3.

2. APPLIANCES

Burners

Weber, E. J. MINIMIZING NOISE OF EXTINCTION. *Am. Gas Assoc. Monthly* 29, 217-218, 254-255 (1947) *May.*

A discussion is given of the results of a research project at the A.G.A. Testing Laboratories for the Committee for Domestic Gas

Research. In general the maximum per cent primary air permissible without noise (A) is equal to

$$A = \frac{0.31}{a} \left\{ \frac{P}{(RD)^2} \right\}^{1/3}$$

where P = gas pressure, R = input rate per sq. in. port area, D = mixer tube diameter 3 in. from throat, a = single port area.

E. F. Davis

3. COMBUSTION AND INDUSTRIAL FURNACES

Combustion Calculations

Linden, H. R. and Othmer, D. F. COMBUSTION CALCULATIONS FOR HYDROCARBON FUELS. *Chem. Eng.* 54, 115-119 (1947) *April.*

A simplified system for combustion calculations is developed, based on the carbon-hydrogen (C/H) ratio in the fuel. Empirical methods of determining this ratio to a maximum error of 3% are described, based on the 50% ASTM boiling point, the ASTM distillation slope, the API gravity and the aniline point. A nomograph relates these properties to the C/H ratio. Other nomographs give heat contents of liquid petroleum fractions in terms of their C/H ratios, and the air requirements for the combustion of hydrocarbons.

Abstractor's Note: This is the first half of the article which is to be continued.

S. Katz

Combustion Characteristics of Town Gas

Wood, J. W. THE COMBUSTION CHARACTERISTICS AND SULFUR CONTENT OF TOWN GAS. *Gas Times (British)* 50, 235-238 (1947) *February* 15.

A partially completed survey is reported covering the principal gas-making coals, carbonizing plants, methods of operation and calorific values of gas for the principal industrial areas of England. Chemical compositions, sulfur content, physical and thermal properties, air requirements, and burner test data are included.

C. Von Fredersdorff

Combustion Data for Refinery Gases

Mekler, L. A. and Von Fredersdorff, C. G. REFINERY GAS FUELS. *Petroleum Refiner* 26, 81-94 (1947) *February.*

Since modern refining methods require an accurate control of the temperature of materials leaving the process heaters, gas firing, with its facility of control, is the desired means of supplying heat to all process units. Present day intensive processing requires more heater fuel per barrel of crude than in the past. Furthermore the supply of refinery gases available for fuel is proportionately less since a significant portion of the fuel gases formerly burned is processed into gasoline components and other products. Natural gas is being used in constantly increasing proportions to overcome such shortages of refinery fuel gas which exist in most present day processing plants. A summary of the properties of a whole range of refinery gases varying from 1095 to 2000 Btu per cu. ft. is given. Empirical expressions for the calorific value, hydrogen content, and density are derived for these gases from data obtained from various processing plants. Theoretical calculations of the combustion characteristics such as theoretical flame temperature and air requirements for refinery fuel gases as well as experimental data on the velocity of flame propagation as a function of hydrogen content and primary air are presented. A dissertation is given on industrial burners including the inspirating, venturi, floor, and flameless types. Charts for estimating capacities of single-jet inspirating burners and formulae are shown.

C. Von Fredersdorff

Drying Ovens

Keller, J. D. INFRA-RED DRYING. *Industrial Heating* 14, 568-570, 572, 574, 576, 578, 580, 582, 584 (1947) *April.*

A discussion is given of the various types of equipment available for infra-red drying ovens, including the electric heat lamps. Comparisons of each type of firing are made, pointing out the relative advantages and disadvantages. A brief summary of factors to be considered in the designing of drying ovens is given.

E. F. Davis

Gas Turbine

GAS-TURBINE TEST RESULTS SHOW ACTUAL PERFORMANCE BETTER THAN GUARANTEED. *Power* 91, 68-69 (1947) *April.*

Test results of performance of a 4000 kw. Brown-Boveri gas turbine designed for emergency service show an overall full-load thermal efficiency of 19.5% at 1020°F. as compared to a theoretical efficiency of 18.0% at 1100°F. The unit could show a 21% overall efficiency at 5000 kw. and 1100°F. (without the use of a regenerator) if it were not limited on the alternator capacity. The turbine responds practically instantaneously (40 seconds) to abrupt changes from no load to full load and vice versa and follows the predicted efficiency curves very closely up to 3000 kw. Test data are included.

C. Von Fredersdorff

High Temperature Flames

HIGH TEMPERATURE FLAMES. *Coke & Gas (British)* 9, 50-53 (1947) *February.*

The generation and characteristics of high temperature flames and application to industrial uses are discussed. The radiating ability of gas and oil flames as well as the merits of gas and fuel oil are compared.

C. Von Fredersdorff

Industrial Bake Ovens

Le Grand, R. DODGE BODIES BAKED BY GAS OVENS. *Am. Gas Assoc. Monthly* 29, 213-216, 254 (1947) *May.*

An elaborate discussion of a direct-fired, recirculating type bake oven for automobile bodies is given. Factors such as time of bake, temperature control, circulation system, effect on colors and type of finish are discussed.

E. F. Davis

Industrial Ovens

Ruff, R. J. RECIRCULATION AS APPLIED TO HEATING AND COOLING ON INDUSTRIAL OVENS. *Industrial Gas* 25, 9-10, 26-27 (1947) *January.*

The achievements of recirculation industrial ovens including increased rate of production as well as fuel saving are discussed. Also included is a summary of the advantages of using the recuperative, recirculating type cooling systems in connection with circulating ovens.

E. F. Davis

Radiant Heating

Wilson, W. E. TIME LAG IN RADIANT HEATING. *Heating, Piping & Air Conditioning* 19, 82-86 (1947) *April.*

It is shown here that the principal factors determining the time lag of a floor panel heating system are the amount of mass below the ducts or pipes carrying the heating medium which responds to changes in temperature of the heating medium, and the temperature of this mass at the beginning of a daily heating cycle. The effect is illustrated strikingly by comparing indoor temperature variation with time for underfloor masses of 10,500 and 105,000 lb., a ratio of time of recovery of about five to one is shown to exist, with 30 hr. required to bring the indoor temperature up to comfort level with the more massive system.

Author's abstract

4. CARBONIZATION AND GASIFICATION

Carbonization of Low Ash Coal

LOW ASH COAL IN CARBONIZATION. *Gas J. (British)* 250, 36, 39 (1947) *April* 2.

Because of the difficulties encountered in the ignition and combustion of gas coke, the British gas engineers have turned their attention to the utilization of low ash coal in the carbonization industry. Production of a smokeless fuel of low ignition temperature and high reactivity is being accomplished with coals of not more than 4% ash, the ash content of the final product being less than 6%. Reduction of the ash content of the raw coal from 18% to 4% is accomplished by de-dusting, screening and washing. The fines from the washing are collected by sedimentation and used for firing of boilers. The washed coal is drained, crushed, and stamped into seven ton cakes and charged into the oven through the ram side of the oven. By stamping of the coal into cakes, a higher bulk density is obtained. This permits filling of the oven, thereby increasing the yield of by-products. The moisture content of the coal as charged is about 12%, which is the correct amount for the production of metallurgical coke. The final product is cut by circular saws and screened to various sizes to meet the needs of the customers. Washing of the coal at the mines results in a saving of freight costs. The mines lose the sale of the washed fines and have the added cost of washing the coal and disposal of the ash. To compensate for these additional costs, the cost of the carbonized coal produced in this manner is increased by approximately 30%. Carbonization of 4% ash coal results in a 20% increase in therms of gas per ton compared with a coal of 18% ash, while the tar yield increases from 12.5 to 18.0 gallons per ton and the make gas of 450 Btu increases from 15,110 to 18,220 cu. ft. per ton.

G. M. Platz

Carbonizing Properties of Coal

Reynolds, D. A., Davis, J. D., Brewer, R. E., Ode, W. H., and Wolfson, D. E. CARBONIZING PROPERTIES OF ELKHORN NO. 3—BED COAL FROM WHEELWRIGHT MINE, FLOYD COUNTY, KY. *U.S. Bureau Mines Tech. Paper* 697 (1947).

This paper gives results of an investigation of the composition and carbonizing properties of Elkhorn No. 3 bed coal from Wheelwright mine, Wheelwright, Floyd County, Ky. The study included Bureau of Mines—American Gas Association tests at 500°, 600°, 700°, 800°, 900°, and 1000°C. and various chemical and physical tests designed to evaluate the oxidizing, expansion, and agglutinating properties of coal. The carbonizing and plastic properties of blends of Elkhorn No. 3 and Pocahontas No. 3 coal were determined.

Authors' Abstract

Coking Low Ash Coals

Barritt, D. T. PRACTICAL EXPERIENCES IN THE COKING OF DANGEROUS LOW-ASH COALS. *Gas J. (British)* 250, 33 (1947) *April* 2.

The object of this article is to describe experiences with a modern coking plant to produce high density coke from compressed charges of strongly coking coals. Compressed charges of coal, made by mechanically stamping of the coal into a cake with the aid of a steel cake box, were introduced through the ram side of the oven. The compressed cakes have a bulk density of 60 to 70 lb. per cu. ft. against 48 lb. per cu. ft. for top charging. In a battery of new ovens, compressed charges of strongly coking coals were introduced. Within ten days of operation, "stickers" began to develop in the low ash ovens, while operation of the high volatile ovens was normal. Reduction in bulk density and thickness of the low ash compressed charges failed to overcome sticking, forcing return to top charging procedures. Further experimentation with breeze blending proved unsuccessful because of low bulk density. Tests

in tapered ovens were rather successful; once the charge was on the move, it rarely jammed. Recommendations for design of compressed charge ovens are given. Koppers expansion tests should be conducted on the coal to determine the critical density. With high volatile coals, parallel ovens are suitable, compressed charges being 1½ inches less in width than the oven. With low volatile coals, tapered ovens and tapered charges are necessary. It is recommended that top charging equipment be provided to deal with broken charges. The battery should be started up on top charging, compressed charges being introduced gradually as working conditions are reached.

G. M. Platz

Gasification with Oxygen

OXYGEN-ANTHRACITE GAS PRODUCED SUCCESSFULLY. *Chem. Eng.* 54, 186-187 (1947) *April.*

Satisfactory results were obtained at Trail, British Columbia, in manufacture of synthesis gas from fine sizes of anthracite with oxygen blast in Wellman-Galusha producers by plant scale trials made at Consolidated Mining and Smelting Co. of Canada. This work was directed by Dr. C. C. Wright of Penn State College, who reports in a preliminary way very satisfactory results through the Anthracite Institute. Carload lots of barley and rice sizes of anthracite were gasified in these tests for production of a high-purity synthesis gas containing CO and H_2 in desirable ratios. The purity compared favorably with comparable gas made commercially from coke. The producer when blown with steam and oxygen gasified rice anthracite at double and barley anthracite at triple the production rates of the same equipment gasifying with air and steam. Further development of the engineering possibilities here suggested is contemplated by the anthracite industry.

Complete item.

Underground Gasification

Hightower, J. V. GASIFYING COAL UNDERGROUND. *Chem. Eng.* 54, 107-109 (1947) *April.*

This article closely parallels others written on this project. The author describes operating difficulties encountered in the light overburden and in burn-outs. A description of the construction of the combustion tube is given. A table showing the rate of gas production, heating value and the composition of the make gas under various operating conditions is given.

G. M. Platz

Waste Disposal

Gollmar, H. A. [WASTE DISPOSAL IN THE] COKE AND GAS INDUSTRY. *Ind. Eng. Chem.* 39, 597-601 (1947) *May.*

Waste disposal problems in the manufacture of coke and gas in by-product coke ovens are discussed. Phenols and other troublesome ingredients are readily destroyed by bacterial action if the wastes are sufficiently diluted. When adequate dilution does not occur, special processes are used, as in steel-making areas in which large coke-manufacturing units are concentrated. Processes for the recovery of phenols, usually the most objectionable ingredients, are described in more detail. Other wastes and methods of disposal are discussed. Sulfur in gases discharged to the atmosphere is a waste problem of increasing importance because of the mining of coals of higher sulfur contents. Plants now in operation remove the sulfur from the gas and recover it as sulfuric acid.

Author's abstract

Water Gas Generator

Reynolds, H. A. WATER GAS GENERATOR AIR SUPPLY. *Am. Gas J.* 166, 11-13 (1947) *April.*

This article discusses the proper and intelligent selection of blowers, blast mains, and pipe

designs for use with large modern water gas sets. The blower should have a constant pressure characteristic so that a sudden decrease in the volume used will not produce a large rise in pressure with consequent "lifting" of the fire and loosening of the coke. Improperly placed explosion heads and short radius elbows reduce the pressure and volume available for blowing the set. Purchasers of large water gas sets would benefit by supplying more complete specifications as to the exact duty cycle.

R. Sharpley

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Bottom-Hole Pressures

Fowler, F. C. CALCULATIONS OF BOTTOM-HOLE PRESSURES. *Petroleum Engr.* 18, 88, 90 (1947) *March.*

A method for calculating bottom-hole pressures is presented. It is said to be faster than and as accurate as the two shorter of three methods presented by Rzasa and Katz *(Trans. Am. Inst. Mining Met. Engr.* 160, 113 (1945). The method involves the use of an average temperature for the column of gas in the well. Graphs are then constructed for different reduced temperatures and pressures so that the answer can be obtained graphically.

J. D. Parent

Carbon Black Process

COLUMBIAN CARBON INTRODUCES NEW FURNACE PROCESS. *Chem. Eng. News* 25, 1115 (1947) *April* 21.

A new process for producing carbon black has been developed by the Columbian Carbon Company under the trade name of Statex K. By means of several jets, a relatively cold hydrocarbon "make" gas is introduced into a furnace containing turbulent blast gases burning at about 2400°F. Because the reaction conditions of blast gas, blast air make gas, temperature, and condition of furnace atmosphere are under precise control, the particle size, structure and surface activity are all predeterminable. The gas is separated from the product by means of Cottrell precipitators and centrifugal cyclones. Since a single Statex K furnace occupying 400 sq. ft. produces as much carbon black as 35 channel houses spread over 4200 sq. ft., a sizable saving of plant area and building material is obtained by the former. The furnace process has a recovery efficiency of 25% of total carbon while the channel process has only 5% efficiency, but only the latter product could be used in making tire treads. The Statex K process not only has greater recovery efficiency but also road tests show that it is equal to or superior to the channel black in both synthetic and natural tires.

S. Mori

Casinghead Gas Conservation

CASINGHEAD GAS CONSERVATION BY REINJECTION AT RINCON. *Oil Weekly* 125, 39-41 (1947) *May* 12.

Continental Oil Company's Rincon plant processes about 12 MMcf/day of casinghead gas. The plant produces LP products and gasoline and returns dry gas back to the reservoir. It is felt that gas control is greater where there originally were gas caps and where injection is made to the highest part of the reservoir. Where no gas cap was present ultimate oil recovery may be expected to be increased by gas injection although effective gas storage seems doubtful.

J. D. Parent

Cleaning Pipe Lines

Serafino, C. A. INTERNAL CLEANING OF GAS PIPE LINES. *Petroleum Engr.* 18, 180 (1947) *March.*

The usual method of using a single scraper is stated. A new time saving procedure to be used when more than one scraper is employed is presented.

J. D. Parent

Compressors

Moore, O. H. OPERATING EXPERIENCES WITH ANGLE-TYPE COMPRESSORS. *Oil Gas J.* 45, 67-68, 70, 74-75 (1947) *May* 3.

The author describes the operating experience of Tennessee Gas and Transmission Company with angle type compressors. He feels that it is too soon to state definite conclusions as to merit especially since the system was operated during a period which was very critical as to personnel and delivery of equipment.

J. D. Parent

Compressors

Neubauer, E. T. P. GAS TURBINE-DRIVEN CENTRIFUGAL COMPRESSORS FOR NATURAL GAS PIPE LINES. *Oil Gas J.* 45, 59-61, 63 (1947) *May* 3.

The advantages of the centrifugal type of compressor and the possibility of its use in natural gas transmission are presented. Closer spacing of stations would be required and one unit could handle 250 MMcf/day. Electric motor drive seems to be necessary for the particular duty, but low maintenance is attractive. Fundamental characteristics are related.

J. D. Parent

Compressors

Worley, C. S. FIELD COMPRESSOR STATIONS. *Petroleum Engr.* 18, 188, 190 (1947) *March.*

It is pointed out that leaving gas in a reservoir is just as wasteful as venting it. With increased gas price and high investment in transmission lines it has become economical to remove gas from wells until the pressure is very low. This necessitates field compressor stations. Since a decline in intake or well pressure attends production the compressor can not be designed for a fixed set of conditions. Recommendations as to location and design of field compressors are given.

J. D. Parent

Computation of Well Capacity

Martin, W. F. PLOTTING BACK PRESSURE OPEN FLOW CURVES. *Petroleum Engr.* 18, 78, 80, 82, 85 (1947) *March.*

Charts are presented for the computation of well capacity by the back pressure method.

J. D. Parent

Condensates

Koepf, E. H. MOBILE LABORATORY FOR GAS CONDENSATE STUDIES. *Oil Gas J.* 45, 108-111, 135-136 (1947) *April* 26.

The design of the Atlantic Refining Company's mobile laboratory for gas-condensate studies is described. Results obtained in two fields are presented.

J. D. Parent

Conservation

HUMBLE GAS CONSERVATION PROGRAM. *Petroleum Engr.* 18, 66, 68 (1947) *April.*

A brief description is made of Humble Oil and Refining Company's program to conserve casinghead gas.

J. D. Parent

Conservation

Thompson, E. O. TEXAS WILL HAVE 69 GAS CONSERVATION PLANTS COSTING $127,000,000. *Oil Gas J.* 46, 44-45 (1947) *May* 10.

The author who is chairman of the Texas Railroad Commission relates what is being accomplished in Texas to eliminate wastage of gas, particularly casinghead gas. The data are felt to be most encouraging.

J. D. Parent

Dehydration

GAS DEHYDRATION AT PECAN ISLAND. *Oil Gas J.* 45, 82-83 (1947) *April* 12.

Humble Oil and Refining Company has put into operation in the Pecan Island gas field a glycol dehydration system of normal capacity of 50 MMcf/day operating at pressures of 1000 psi or less. Operating details are presented.

J. D. Parent

Dehydration

Sedgwick, D. L. AUTOMATIC DEHYDRATION OF LARGE VOLUME OF GAS AT HIGH PRESSURE. *Gas Age* 99, 38-39 (1947) *April* 17.

A quantitative flow sheet for the dehydration of natural gas by glycol is presented. The plant was designed by the Dresser Engineering Co. Auxiliaries are indicated on the flow sheet and some plant data are stated.

J. D. Parent

Distribution

DISTRIBUTION SYSTEM CAPACITIES. *Gas* 23, 51-58 (1947) *May.*

This is an interim report of the Distribution Capacities Sub-Committee of the Technical Committee of the Indiana Gas Association. Data and ideas of interest to the distribution engineer are presented. Some design charts have been included.

J. D. Parent

Dust Removal

Dawe, H. F. and Stepanek, J. E. DUST SCRUBBER RESEARCH YIELDS VALUABLE DATA. *Petroleum Engr.* 18, 192, 195-196, 198, 200, 202 (1947) *March.*

A progress report on dust scrubber research is presented. A design for removing dust from natural gas by oil scrubbing is shown. Laboratory work with suspensions of various powders in compressed air is described in detail.

J. D. Parent

Gas Injection

Hensley, H. S. APPLICATION TO CYCLING OF GAS INJECTION BELOW NORMAL GAS-WATER CONTACT. *Oil Gas J.* 45, 84-85, 88-89, 92-93 (1947) *May* 3.

Gas is being injected through edge wells into salt water sands successfully in a few fields. The author presents several case histories. Below-water injection was first attempted in 1944.

J. D. Parent

High Pressure Line

Jackson, W. G. WORLD'S LONGEST 2500-PSI LINE. *Gas* 23, 37-41 (1947) *May.*

The Bureau of Mines high pressure helium line was laid from Shiprock, N. M. to Gallup, N. M. It is schedule 80, 2 inch I.P.S. seamless plain end pipe, welded its entire length of 90 miles.

J. D. Parent

LP Gas for Auxiliary Gas Supply

Jury, V. AUXILIARY GAS SUPPLY DURING TRANSMISSION LINE SHUTDOWNS. *Gas* 23, 42-45 (1947) *May.*

Temporary use of LP gas is recommended when the natural gas transmission line is shut down. A detailed procedure for installing this service is outlined.

J. D. Parent

Natural Gas Utilization

Smith, H. M. and Holliman, W. C. UTILIZATION OF NATURAL GAS FOR CHEMICAL PRODUCTS. *Petroleum Refiner* 26, 75-84 (1947) *April.*

This article is a condensation of U.S. Bureau of Mines I.C. 7347, March 1947 which was abstracted in *Gas Abstracts* 3, 78 (1947).

R. S. Goodrick

Pipe Line Flow

REPORT ON PIPE-LINE FLOW. *Oil Gas J.* 45, 63 (1947) *May* 3.

The first progress report on the pipe line flow investigation by J. W. Ferguson is briefly outlined. Mr. Ferguson has surveyed and critically discussed the relevant literature.

J. D. Parent

Pipe Protection

Appleman, M. D. PROTECTING PIPE IN OPEN SYSTEMS. *Am. Gas Assoc. Monthly* 29, 194-196 (1947) *April.*

The author gives a brief summary of experiments carried out previously by others on the corrosion of pipes due to anaerobic sulfate reducing bacteria. Since their results were discouraging, he proposes two alternate methods. The first is the use of toxic chemicals either impregnated in the material to be placed around the pipes or mixed in the soil in the vicinity of the pipe as a relatively insoluble compound. Secondly, he suggests stabilizing the soil around the pipes by compacting it to prevent water seepage and coating the outer part of it with different waterproofing compounds. At present there is much to be done on these methods. In order to do this, the author shows the need of completely understanding the characteristics of the sulfate reducing bacteria so that corrosion tests may be carried under accelerated conditions by placing the treated pipes in pits inoculated with the bacteria under optimum growth conditions.

S. Mori

Pressure Maintenance

Williams, N. PRESSURE MAINTENANCE. *Oil Gas J.* 46, 80-81, 102-103, 106-107 (1947) *May* 24.

The Continental Oil Co. has been conducting pressure-maintenance operations at the Rincon field in Southwest Texas for the past six years. It is felt that it is too early to draw definite conclusions as to possible increases in ultimate recovery. However, satisfactory control of pressure decline and deferment of installing lifting equipment have been achieved.

J. D. Parent

Purification

Thompson, V. and Graff, R. A. PURIFICATION OF NATURAL GAS IN NORTHWESTERN NEW MEXICO. *Oil Gas J.* 45, 116, 118, 131 (1947) *April* 19.

Southern Union Gas Co. has completed construction of a purification plant for natural gas in the Barker-Dome, New Mexico, gas field. The gas has 15% carbon dioxide and 1% hydrogen sulfide. It is purified by a treatment with

monoethylamine solution after pressure reduction to 1000 psi. Process details are stated.

J. D. Parent

Removal of Liquid Hydrocarbons

Simon, J. T. REFRIGERATION REMOVES LIQUID HYDROCARBONS FROM GAS IN TRANSIT. *Petroleum Refiner* **26**, 117-119 (1947) *April.*

Trouble with collection of liquid hydrocarbons in the transmission line was experienced. Operations were revamped so as to chill the dehydrated gas somewhat below ground temperatures before it entered the line. Liquid was condensed and removed.

J. D. Parent

Sampling

Katz, D. L. and Brown, G. G. SAMPLING TWO-PHASE STREAMS FROM HIGH PRESSURE CONDENSATE WELLS. *Petroleum Engr.* **18**, 95-96, 98, 100, 102 (1947) *March.*

This is the first of two articles dealing with the correct sampling of two phase streams from natural gas wells. The problem is to design and operate a small scale separator in conjunction with a sampling device inserted in the fluid stream in such a way as to obtain a truly representative sample. Apparatus and test procedure are presented in this first installment.

J. D. Parent

Sampling

Katz, D. F. and Brown, G. G. SAMPLING TWO-PHASE STREAM FROM HIGH PRESSURE CONDENSATE WELLS. *Petroleum Engr.* **18**, 78, 80, 82, 84, 86 (1947) *April.*

Based on extensive tests, a procedure for sampling is suggested.

J. D. Parent

Transmission

Miller, B. GAS TRANSPORTATION SYSTEM CALCULATIONS. *Gas Age* **99**, 57-60 (1947) *April* 17.

Deliverability of pipe line depends on the 5/2 power of the pipe diameter and on the friction factor. The friction factor depends on the pipe diameter also so that the net result is that the deliverability depends on a power somewhat different than 5/2. Mr. Miller shows that this power is about 2.6 to 2.7 normally.

J. D. Parent

Transmission

Miller, B. GAS TRANSPORTATION SYSTEM CALCULATIONS. *Gas Age* **99**, 27-31 (1947) *May* 1.

Variation in deliverability with flow variable is discussed in an elementary manner.

J. D. Parent

Transmission

Miller, B. GAS TRANSPORTATION SYSTEM CALCULATIONS. *Gas Age* **99**, 36-38, 40 (1947) *May* 15.

This is the fourth installment in a series. An illustration of the use of the flow rate equation is presented.

J. D. Parent

Transmission Line Design

Strong, R. G. and Beals, T. H. DESIGN OF LONG DISTANCE NATURAL-GAS TRANSMISSION LINES. *Oil Gas J.* **45**, 88, 90, 92 (1947) *April* 19.

The usual factors required for design are noted: maximum volume to be handled; location of producing and consuming centers; geograph-

ical features such as rivers to be crossed; soil nature; inlet and delivery pressures; and cost of capital, construction, labor and materials. "General design" includes determination of minimum wall thickness, pipe diameter and sizes of compressor stations. General considerations are presented, as well as tabulated data for illustrating optimum designs.

J. D. Parent

Underground Storage

Kubista, W. R. PERFORMANCE OF TWO UNDERGROUND GAS STORAGES. *Gas Age* 99, 41-47 (1947) *April* 17.

Oklahoma Natural Gas Company uses two underground gas storages. The Osage reservoir is relatively small, but has a high deliverability and is conveniently located near Tulsa. The Haskell reservoir is of high capacity and is fairly centrally located with respect to the transmission system; it is being used for seasonal peaks of several months duration. The annual turnover is expected to become 4 to 4.5 billion cu. ft. Pressure-volume relations and deliverabilities of both storages are presented in detail. Some pressure loss attends storage and is thought to be due to (1) Slow displacement of edgewater; (2) Slow filling of locations of low permeability; and (3) Leakage into other formations.

J. D. Parent

Waste Gas Utilization

Schwartz, C. A. SMALL GASOLINE PLANT UTILIZES WASTE GAS FOR ECONOMIC OPERATION. *Petroleum Refiner* 26, 125-128 (1947) April.

With the increased demand for LP gas and natural gas, smaller size gasoline plants have become economically feasible. A detailed flow sheet is presented for Caska Corporation's Quitman, Texas plant which handles 1,250 Mcf/day of gas.

J. D. Parent

The following articles, which have not been abstracted, are called to your attention:

Bickel, L. A. REMOTE PRESSURE CONTROL IN DALLAS. *Gas Age* 99, 24 (1947) *May* 1.

Flood, L. INVENTORY OF GAS-DRIVE PROJECTS IN WEST TEXAS AND NEW MEXICO. *Oil Gas J.* 45, 94-96 (1947) *April* 12. Peterson, L. F. INVENTORY OF GAS-DRIVE PROJECTS IN NORTH TEXAS. *Oil Gas J.* 45, 91-92 (1947) *April* 12.

Pryor, C. C. GAS ABSORPTION-DEHYDRATION PLANT PROCESSES 150,000,000 CUBIC FEET DAILY. *Petroleum Refiner* 26, 91 (1947) *April.*

Sappington, J. M. DUAL CONTROL SYSTEM SYNCHRONIZES COMPRESSOR-SPEED-INTAKE GAS PRESSURE. *Petroleum Refiner* 26, 88 (1947) *April.*

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Butane Isomerization

Chenicek, J. A., Iverson, J. O., Sutherland, R. E., and Weinert, P. C. BUTANE ISOMERIZATION. U.O.P. PROCESS. *Chem. Eng. Progress* 43, 210-218 *"Trans. Section"* (1947) *May.*

The Universal Oil Products Company process for catalytic isomerization of normal butane into isobutane was used in eleven domestic installations for the production of 7100 bbl./

day (design capacity) of isobutane. Catalyst deposited on quartz chips in the reactor is maintained at constant activity by continuous addition of aluminum chloride dissolved in a portion of the normal butane charge. Effluent from the reactor is distilled in the "$AlCl_3$ column" where dissolved aluminum chloride is recovered and recycled to the reactor. Corrosion, pumping, maintenance and initial startup problems were solved during the development of the process. The procedure is adaptable to the isomerization of pentane and hexane fractions to obtain 77-80 octane number products.

C. H. Riesz

Carbon Disulfide Removal

Parkes, D. W. and Moncrieff, I. A. (to Robinson Bros. Ltd. (England)). PROCESS FOR THE REMOVAL OF CARBON DISULFIDE FROM A HYDROCARBON LIQUID. *U.S.* 2,418,047 (1947) *March* 25.

A process is described for the removal of CS_2 from a hydrocarbon liquid by means of treatment with an aqueous solution of dimethylamine. Amine is used in molar proportion to the CS_2 present and the amount of amine used may be reduced by substituting an equivalent quantity of a strong alkali, e.g., NaOH, KOH, or lime. It was found that 95% or more CS_2 could be removed from crude benzole within 15 minutes by the application of a batch process of this type. Approximately 97% of the dimethylamine originally taken can be recovered for future use. The process may be used continuously in a manner similar to that employed for batches, or it may be applied in a countercurrent scrubbing system. Some decrease in efficiency results in the latter case due to high amine losses.

H. Hakewill

Catalytic Cracking

Noll, H. D., Bland, R. E. and Kelso, G. EFFECT OF TEMPERATURE IN THERMOFOR CATALYTIC CRACKING. *Oil Gas J.* 46, 64-66 (1947) *May* 10.

Gasoline octane number increases while yield decreases as the average reactor temperature is raised from 775 to 960°F. The selection of optimum temperature can be made only after a critical analysis of all factors which affect the economics of the situation.

C. H. Riesz

Catalytic Cracking

Purvin, R. L. SUSPENSOID CATALYTIC CRACKING. *Petroleum Processing* 2, 328-331 (1947) *May.*

The Imperial Oil Ltd. at the Sarnia, Ontario refinery is currently processing 2900 barrels of charge by the Suspensoid process. About two pounds of spent Super Filtrol from the lubricating oil clay contact plant is used per barrel of charge. The process improves yields and quality of gasoline but it is not to be considered the equivalent of TCC or fluid catalytic cracking. It is estimated that the additional operating costs above thermal cracking amount to 12 cents per barrel of fresh feed; savings in tetra-ethyl lead alone should cover this increased cost.

C. H. Riesz

Cycloversion

Daniels, V. W. and Conn, M. W. PERCO CYCLOVERSION FOR THE SMALL REFINER. *Petroleum Processing* 2, 391-392, 394-397 (1947) *May.*

The catalytic desulfurization and catalytic reforming phases of Perco Cycloversion offer means for improving the octane quality of thermally cracked, straight-run and natural gasolines produced from existing equipment, with a minimum of additional investment and operating charges. Data is given on characteristics of raw and treated stocks of various types, from both commercial and pilot plant operations, to show the degree of improvement in clear and leaded octane numbers, by both ASTM and Research Methods.

Authors' abstract

Refinery Processes

Read, D. STOPGAP PROCESSES VS. CATALYTIC CRACKING. *Oil Gas J.* 45, 76-80, 83 (1947) May 3.

A hypothetical refinery situation is analyzed. Fluid catalytic cracking has the highest initial installation cost but possesses inherent advantages in comparison with two other proposed schemes.

C. H. Riesz

7. ANALYTICAL METHODS AND TESTS

Nitrogen Determination

Ballentine, R. and Gregg, J. R. MICRO-KJELDAHL DETERMINATION OF NITROGEN. *Anal. Chem.* 19, 281-283 (1947) *April.*

Several factors affecting the accuracy of nitrogen determination by the Micro-Kjeldahl method were investigated. Improved procedures for the digestion, distillation, and titration steps are described. Potassium biiodate is recommended for the iodometric titration of the ammonia released. Tests made on known organic substances by this method demonstrated good recovery and reproducibility for nitrogen ranging from 0.125 to 1.2 mg.

H. Hakewill

Sulfur Determination

Wagner, E. C. and Miles, A. H. VOLUMETRIC SEMIMICRODETERMINATION OF SULFUR IN ORGANIC COMPOUNDS BY THE USE OF THE OXYGEN BOMB. *Anal. Chem.* 19, 274-276 (1947) *April.*

The determination depends upon the combustion of a sample in a Parr oxygen bomb to sulfuric acid and precipitating it to benzidine sulfate which is titrated with a standard alkali. The method is applicable where samples contain 2.5 to 15 mg. of sulfur, the accuracy being the highest (99.6 to 100.2%) with 5 to 15 mg. A table of results for a number of organic sulfur compounds by the semi-micro method is presented.

M. C. Miyaji

Vapor Pressure Determination

Gould, C., Jr., Holzman, G., and Niemann, C. DETERMINATION OF THE VAPOR PRESSURE OF LIQUIDS ON A MILLIGRAM SCALE. *Anal. Chem.* 19, 204-206 (1947) *March.*

A procedure is described for the determination of the vapor pressure of organic liquids on a micro scale. The method is a variation of the Emich procedure. Samples of the order of 5 cu. mm. are adequate for the determination. Reference is made to the use of the data for the determination of heats of vaporization also.

S. Katz

9. ORGANIC CHEMISTRY

Infra-Red Spectra of Dienes

Rasmussen, R. S. and Brattain, R. R. INFRARED ABSORPTION SPECTRA OF SOME C_4 and C_5 DIENES. *J. Chem. Phys.* 15, 131-135 (1947) *March.*

The infra-red spectra of 1, 3-butadiene, 1, 2-butadiene, isoprene and cis- and trans-1, 3-pentadiene are given graphically and the principal maxima of the spectra are tabulated. The spectra are analyzed in very general terms.

S. Katz

Infra-Red Spectra of Octenes

Rasmussen, R. S., Brattain, R. R. and Zucco, P. S. INFRA-RED ABSORPTION SPECTRA OF SOME OCTENES. *J. Chem. Phys.* 15, 135-140 (1947) *March.*

The spectra of 1-octene, 2-octene, 3-octene, 4-octene, 2-methyl-1-heptene, 6-methyl-1-heptene and 2, 2, 4-trimethyl-1-pentene are given. Regularities in the spectra of these octenes are correlated with their structural similarities.

S. Katz

Infra-Red Spectra of Olefins

Rasmussen, R. S. and Brattain, R. R. INFRA-RED ABSORPTION SPECTRA OF THE C_2 TO C_4 MONO-OLEFINS AND OF 2-METHYL-2-BUTENE. *J. Chem. Phys.* 15, 120-130 (1947) *March.*

The infrared spectra of ethylene, propylene, 1-butene, cis-2-butene, trans-2-butene, isobutene and 2-methyl-2-butene have been measured. The spectra are presented in standard National Bureau of Standards type charts and the principal absorption maxima are tabulated. A general discussion of the interpretation of the spectra is included, as well as more detailed analyses of the ethylene and propylene spectra.

S. Katz

10. CHEMICAL ENGINEERING

Fractionation Techniques

Cicalese, J. J., Davis, J. A., Harrington, P. J., Houghland, G. S., Hutchinson, A. J. L., and Walsh, T. J. MISCELLANEOUS FRACTIONATING TECHNIQUES. *Petroleum Refiner* 26, 141-156 (1947) *April.*

The fractionation of hydrocarbon mixtures in standard bubble-cap plate towers is discussed in a manner designed to emphasize the capacity and efficiency factors for existing equipment. A brief theoretical discussion is followed by sections on operating procedure, instrumentation, changes outside towers, and changes inside towers, to familiarize operators with certain techniques used by the authors to improve the performance of fractionators. An engineering investigation of a specific tower, covering the development of improved performance, is appended as an illustration of the application of parts of the text of the paper.

Authors' abstract

Thermodynamic Data

Finniecome, J. R. NEW TEMPERATURE—TOTAL HEAT—ENTROPY CHART FOR GASES WITH VARIABLE SPECIFIC HEATS. *Engineers' Digest* 4 73-76 (1947) *February.*

A temperature—total heat—entropy chart has been prepared for gas turbine engineers. It is useful for calculations based on a "constant pressure cycle."

J. D. Parent

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Centrifuges

Smith, J. C. SELECTION OF CENTRIFUGES FOR CHEMICAL PROCESSING. *Ind. Eng. Chem.* 39, 474-479 (1947) *April.*

Centrifugal separation is finding ever-increasing use in chemical processing. As a unit operation, it has been the subject of very few publications dealing with methods of estimating the capacity of a given centrifuge. This

article describes the semi-empirical test methods used in selecting centrifuges for chemical processing. There are three types, the nature of the separation problem determining the type of centrifuge to be used. In the case of the high speed, small diameter, vertical solid-bowl centrifuges, actual performance in a given service can be determined only by tests in a laboratory model or in full-scale equipment. Performance data on the second type, the large diameter batch centrifuge, can be obtained from a basket centrifuge at least twelve inches in diameter. The procedure for estimating the capacity of this type is given in detail. For the last type, the continuous automatic centrifuge, preliminary indications can be obtained from battle centrifuge tests but full scale tests are essential for determining the actual operating characteristics. Tables show the type of centrifuge best suited to a given separation and list the principal manufacturers of each class.

J. J. First

Controls for Refinery Processes

Reynolds, E. H., Troutman, W. and Lawn, G. APPLICATION OF AUTOMATIC CONTROL TO GASOLINE PLANT AND REFINERY PROCESSES. *Oil Gas J.* 45, 66-67, 70-72, 74-75 (1947) *April* 5.

A fundamental survey of the instrumentation field is followed by four illustrated examples showing the application of controls to refinery processes.

J. J. First

Gas Flow Resistors

Sivertsen, J. CALIBRATED GAS-FLOW RESISTORS. *Instruments* 20, 333-334 (1947) *April.*

A calibrated gas flow resistor is an open tube which, connected between two gas chambers, will admit a definite amount of the gas to pass in unit time from the high pressure to the low pressure chamber. In production work as well as in laboratory research, an oft-met problem is that of bleeding a small amount of gas at low pressure into a tube or chamber—and to do this in a definite predetermined time. With a limited number of gas flow resistors it is possible to obtain a very large number of flow rates by either series or parallel connections or series-parallel connections. The resultant flow rate con be predicted by simple arithmetic. For series connection we add the time constants and obtain the time it takes for 1 cc. to flow through the resistors. The reciprocal of the sum is the resultant flow rate. For parallel connection we add the flow rates and obtain the resultant flow. Reference is made to a recent U.S. patent on a new type of gas flow resistor which will retain its flow rate accurately. The cross-section of the opening in these new resistors is not a circular opening where a dust particle might cause a clogging, but is a ring opening. Owing to the larger circumference of the ring, its radial dimension is too small for most dust particles to enter, and if any should enter they will only occupy a spot in the longitudinal direction of the resistor and have no measurable effect on the flow rate.

J. J. First

Heat Processing Equipment

Daveler, F. G. NEW DEVELOPMENTS IN HEAT PROCESSING EQUIPMENT. *Gas Age* 99, 21-24, 60, 62 (1947) *March* 20.

The following recent developments in heat processing equipment are discussed. (1) Universal gas atmosphere generator capable of producing endothermic combustion, endothermic cracking, and ammonia dissociation reactions. Used primarily in laboratories, it has been manufactured in production capacities up to 500 cu.ft./hr., and has found application in metal treating, food and chemical processing, and allied industries. Auxiliary equipment such as CO_2 and benzol scrubbers, activated alumina dryers, etc., may be added to the Universal machine. (2) Accelerated drying ovens, electrically heated or gas fired, capable of accelerated treating of paint, enamel, lacquer and

plastic finishes. (3) High spaced aluminum annealing furnace for operation in conjunction with accelerated drying ovens and capable of automatic feeding and discharge. The machine employing radiant type burners anneals aluminum collapsible tubes in 15 seconds. (4) Glass dropping kilns, automatically controlled, for the production of curved glass for watch crystals and safety goggles. The unit is capable of "dropping" or forming 240 separate pieces simultaneously. Photographs of the units described are shown.

C. Von Fredersdorff

Instruments for Gas Cycling Plants

Gudenrath, G. L. INSTRUMENTATION IN GAS-CYCLING PLANTS. *Petroleum Refiner* 26, 85-87 (1947) *April.*

The article discusses the contribution the control engineer can make toward reducing the instrument maintenance and supervision worries of the plant operator. Good process design of a gas-cycling plant should include wise instrument selection and fulfillment of such needs as (a) good supply of operating medium for the pneumatic controls, (b) required surge capacities for control purposes, (c) ample line sizes to accommodate control valves and meter runs and (d) adequate pressure differentials to assure the effectiveness of control valves, etc. An example is given of the selection of equipment for controlling the liquid level in a rich-oil flash tank by regulating the outflow of oil. Either the differential or displacement type of proportional response liquid level control may be used but because of the simpler maintenance requirement, the displacement type usually will be the preferable selection for cycling operations even though the differential type probably affords the closer approach to an ideal "averaging instrument." Other suggestions are given pertaining to temperature measurement in cycling plants where the source of electrical power is not sufficiently reliable for process controls to be dependent upon it, and to the location of controls, valves, regulators, meter bodies and control panels in the plant.

J. J. First

Leak Detector

Burroughs, J. E. DETECTING LEAKS. *Chem. Eng.* 54, 112-114 (1947) *April.*

A considerable share of the successful operation of the Oak Ridge gaseous diffusion plant must be attributed to the use of the mass spectrometer as a leak detector. Helium fed into the system under inspection will indicate leaks on the detector under the most difficult situations. The extension of the method for the inspection of a host of diversified industrial devices from large gas tanks and refrigerator systems to vacuum and X-ray tubes is proposed. Operation is cheap and rapid and the instrument requires little maintenance.

S. Katz

Overfire Jet

Major, W. S. OVERFIRE JETS FOR SMOKE ABATEMENT. *Southern Power & Industry* 65, 44-47, 121-122 (1947) *April.*

The modern overfire jet is a new tool for smoke prevention which is receiving increasing recognition in industrial applications. The overfire jet provides for turbulent combustion of volatile matter immediately above the fuel bed. Important factors in the design of such jets are: (1) Relative position and dimensions of steam jet and air tube; (2) Type of fuel burned and type of turbulence required above the fuel bed. A comparison of results of tests with and without use of overfiring and a discussion of advantageous control instruments are given.

C. Von Fredersdorff

13. NEW BOOKS

Panel Heating

Raber, B. F. and Hutchinson, F. W. PANEL HEATING AND COOLING ANALYSIS. *New York, John Wiley & Sons,* 1947. ....

Utilities Directory

DIRECTORY OF ELECTRIC AND GAS UTILITIES IN THE UNITED STATES——1946. *Washington, D.C., Federal Power Commission.*

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